Chapter 3: Arbitrariness and linearity: de Saussure's 'basic principles'

I concluded Chapter 1 by identifying the field of 'discourse studies' as a possible home for typographic theory. Although interdisciplinary, discourse studies is essentially language-based. This chapter therefore explores some further aspects of the relationship between typography and language. In the first half of this chapter I shall discuss some aspects of the reconciliation of the verbal and the visual, before moving on to discuss the linearity of verbal language, and the effect on the writer-text-reader relationship of freeing readers from that linearity. A key dichotomy is identified, between writer-control and reader-control of the order of presentation, and this is discussed further in Chapter 4.

The criteria for languageness: arbitrary, segmented, systemic and linear

In addition to the twin doctrines of the primacy of speech and the sentence boundary, discussed in Chapter 1, de Saussure presents us with two formidable barriers to the application of linguistic principles to the study of visual aspects of verbal language:

'the linguistic sign...has two primordial characteristics. In enunciating them I am also positing the basic principles of any study of this type.' (de Saussure 1916/1974: 67)

The first principle is the arbitrariness of the bond between the signifier and the signified. Arbitrary signs are distinguished from iconic (or motivated) signs. 'Cat', 'chat' and 'gatos', for example, are arbitrary signs, since they do not resemble any aspect of real cats. 'Meow' and 'miao', being motivated by onomatopoeia, are usually cited as exceptions which prove the rule. They are said not to be strictly linguistic because they can be interpreted by direct reference to experience rather than through knowledge of the language.

De Saussure's second principle is the linearity of the signifier (that is, the language 'surface'). Most linguists are primarily concerned with 'syntagmatic' relations between components: the relationship of each word to its predecessors and successors in the linear sequence. Those text linguists who take sentence linguistics as their model are similarly concerned with the relationship of sentences and paragraphs within the linear series.

These two principles seem to be a necessary precondition for the linguistic method, which seeks to reveal systematic relations between clearly segmented components. They are clearly important if language is to be seen as an abstract or virtual system, existing apart from its context of use. And they are among the most important of the 'design features' of language, as distinct from other sign-systems, listed in linguistics textbooks (for example, Hockett 1958). But although that is the preferred view of many linguistic scientists, few real utterances actually conform to these principles. Unscripted speech, for example, is usually accompanied by motivated signs (such as gestures, expressions, and changes of pitch) which signal the frequent false starts, topic switches and grammatical 'errors' that result from its time-bound linearity (Tannen 1982).

Ironically, in view of the insistence on the primacy of speech, it is only really possible to find actual utterances which conform to the linguistic ideal in the form of printed continuous prose which, being mechanically produced, is formed from a limited set of identical characters. In its usual printed form, prose is verbal, linear, clearly segmented and typographically neutral. It is 'non-visually informative' in Bernhardt's terms, 'unmarked' in Vachek's, or 'arbitrary' in de Saussure's. And the systematic ideal is realized through the application of spelling rules and the opportunity writers have to carefully revise their sentence structures to ensure their grammaticality. A number of important practical issues are at stake when we determine whether typographic features can be handled within a linguistic framework. In spite of the obvious differences between written and spoken utterances, verbal language can still be recognized as having an existence apart from its mode or channel of transmission. Even stripped of the intonations available in speech and the graphic emphasis available in writing, its segmented, arbitrary and linear nature makes it not only translatable, but transcribable in a variety of media. If graphic features transgress on these essential points, we would have to find some other basis for a systematic analysis on which to base what Twyman (1982) called 'graphic translatability'. A topical and pressing issue is how to store graphically organized information (for example, timetables, or diagnostic charts) in electronic form in such as way that it can be accessed in formats as different as printed paper and electronic screens.

Language or paralanguage?

Linguists traditionally deal with segmental aspects of language—the segments themselves (phonemes, morphemes, words and sentences) and the rules for their combination. Since most actual utterances contain features which are not strictly verbal, are iconic in some respect or not clearly segmented, but which contribute both to meaning and to structure, linguists have introduced the term 'paralanguage'. Some have proposed that paralanguage has a counterpart in written language: Bolinger (1975: 478), for example, refers in a diagram to 'paragraphology'.

In spoken language, pointing, winking, waving, shrugging and smiling are all uncontroversially paralinguistic since they are not phonological in nature. Features that are phonological, such as variations of stress, rhythm, tone and pitch are usually deemed 'prosodic', or 'suprasegmental'. This terminological problem need not concern us too much, though, since the distinction between prosody and paralanguage—the one being articulated in sound, and the other not—is easier to make in relation to speech than it is in relation to written language. In written text, everything is to a degree visible (although 'prosody', used in its literary sense of metrical structure in verse, is only as visible as English orthography is regular—ie, unreliably so). I shall therefore use only the term 'paralanguage'.

It could be argued that the term 'suprasegmental' is rather misleading, given that both prosody and paralanguage can be used to emphasize the segmentation of language units—generally at the discourse level. For example, in many variants of English, changes in pitch mark the relative position of words within the sentence; and parenthetical remarks are normally signalled as such by a change in tone of voice.

Lyons (1977) reflects this point by distinguishing between two kinds of paralanguage, modulation and punctuation. I will straight away substitute the term segmentation for 'punctuation', since Lyons appears to be using an everyday term in a special technical sense. Confusion could arise since punctuation, in its everyday sense, could be said to have a modulating as well as a segmenting function.

Modulation describes the way in which the meaning of an utterance may be coloured or emphasized by tone of voice, facial expression or gesture. For example, a sentence like 'Don't be boring' may be taken as an instruction, an insult, a mild protest at an idea rejected or a joke, depending on how it is said. In written language we can achieve a similar, but still ambiguous, effect by italicizing a word or adding an exclamation mark ('Don't be boring!'). Advertising copywriters have developed this use of punctuation to a fine art: the period after short headlines, single word sentences, frequent paragraph breaks with excessive indention. These 'score' our reading of the advertisement (the musical term is suggested by Nash, 1980, and discussed further in Chapter 4) in imitation of an intimate television voice-over—'Kleeno. Because you care.'. Our writing system has normally been considered inadequate, though, by linguists wishing to transcribe speech in its full paralinguistic richness. They have had to invent special notations to give some impression of rises and falls in pitch and the relative stress given to parts of a sentence. It is possible to use italics and bold type to add some vocal quality to writing but only to a strictly limited degree. At the discourse level, though, typographic modulation is common. Textbook designers, for example, often specify different typographic 'voices' to distinguish between, say, the main text, quotations, captions and study guidance.

Segmentation describes the marking of boundaries in spoken or written language. In speech, this may done with pauses, with gesture or with tone of voice. In writing, boundaries may be represented by space, rules or punctuation marks. At levels higher than the sentence (for example, sections of a book, or when the subject of a conversation changes), boundaries are also typically marked by the use of 'metalanguage' language whose function is to structure or monitor the discourse as a whole. Words like 'Well' (in speech) or 'Introduction' (in books) are metalinguistic. In writing, metalanguage is itself often signalled typographically: headings, for example, function because of the way they look as well as through what they say.

Many of those who have directly compared speech and writing comment that, whereas cohesion and structure is achieved in speech through paralanguage, in writing it is established through a more elaborate and formal syntax (Cook-Gumperz & Gumperz 1981; Chafe 1982; Tannen 1982). Cook-Gumperz & Gumperz have studied the implications of this difference for children's 'initiation' into literacy. They comment that

'children's use of intonation is an essential, rather than [a] background or additional part of the information signalling load for a message' (p. 101, their emphasis)⁴³

and that

⁴³ This should be clear from the fact that in the adult context we generally regard speech with exaggerated intonation as childish or patronizing.

'For children, the essential change between written and spoken language is the change from the multi-modality of speech to lexicalized discursive sequences of written language.' (p. 99)

Interestingly, Cook-Gumperz & Gumperz go on to report that children compensate for the lack of paralanguage and prosody in writing by employing graphic means: heavy and dramatic punctuation,⁴⁴ the free mixing of pictures and words, and the unconstrained use of space and writing direction. Typographic and spatial features may, it seems, be more 'natural' than we normally think.

Not surprisingly, since the prefixes 'para-', and 'supra-' imply borderline status, linguists disagree about how exactly paralanguage should be handled and which features should be included. Crystal (1974) represents the liberal view, arguing that

'any vocal effect which can be shown to have a systematic, shared, contrastive communicational function is by definition part of the overall soundsystem of a language, and thus linguistic.' (p. 280)

Once one leaves the securely segmented world of phonemes and morphemes, though, one encounters extreme difficulty in discriminating between linguistic and non-linguistic noises (or marks on paper, presumably). Crystal therefore suggests a scale of linguisticness. At the 'most linguistic' end of the scale are features which are 'most readily describable in terms of closed systems of contrasts' and therefore 'relatively easily integrated with other aspects of linguistic structure (particularly syntax)'. At the other end of the scale would be features which may be 'relatively indiscrete' or have 'a relatively isolated function' and so 'seem to have little potential for entering into systemic relationships'.

In the context of semiology, Eco (1976) similarly suggests that

'The universe of visual communication reminds us that we communicate both on the basis of strong codes (such as language) and indeed

⁴⁴ However, Baldwin & Coady (1978) reported that children up to the fifth grade often ignore punctuation when reading.

very strong ones (such as Morse code) and on the basis of weak codes which are barely defined and continuously changing...' (p. 214)⁴⁵

To determine whether we are dealing with language, paralanguage, or something in between, we can perhaps best assess the linguisticness of typography by considering each of de Saussure's basic principles in turn.

Arbitrariness

Crystal's concept of relative linguisticness is reinforced by an examination of the arbitrariness criterion. This is the criterion by which Bolinger (1975) seems to exclude graphic devices from the linguistic domain when he refers to 'paragraphology'. (His point is made only in the form of a diagram, so his reasoning is not made very explicit.) Although one might have expected such examples as italicization or underlining, which seem directly analogous to intonation in paralanguage, he instead cites punctuation marks and mathematical signs, on the grounds that they are interpreted directly rather than by their equivalence to a phonological feature. Punctuation indeed seems paralinguistic—not for that reason but rather because one of its functions is to indicate how sentences should sound. According to one view of punctuation, the various stops mark pauses of varying length, or the use of exclamatory or interrogative intonation.⁴⁶

Mathematical signs are also a debatable example because what distinguishes them from language is not their phonological status.

⁴⁵ However, a code that is weakly defined and subject to change seems to stretch the meaning of 'code' rather far. A basis for inference that happens to be shared by more than one person need not constitute anything as formal as a 'code'. The distinction between coding and inference is discussed further in Chapter 5.

⁴⁶ According to Husband & Husband (1905: 13), at least two punctuation marks owe their shape to abbreviations of words. If this is the case, then they can lay claim to linguistic, not paralinguistic, status. 'It is said', say the Husbands, 'that the question mark originated as the first and last letters of "Querio" placed one above the other. The "o" becoming in time a dot.' They suggest that the exclamation mark (or 'note of admiration' as it was once called) is a similar development from 'Io' (joy).

Considered separately (rather than in combination, when they can be diagrammatic), they are often simple alternative representations of words ('2+2=4' is an alternative transcription of 'two plus two equals four'). While it is true that they do not correspond to phonological features at the level of the phoneme, they do at the level of the word. Both 'four' and '4' are pronounced $f \upsilon a^r$.

Westcott (1971) disputes the arbitrariness criterion altogether, not only in relation to written language. For example, he cites numerous morphological examples ('longer' is longer than 'long', and 'longest' is longer than either), and syntactic examples (the normal subject-verbobject order represents the actual order of transitive events). He also lists a range of different kinds of iconism in writing (Table 3.1). Similar examples are cited by other writers on this theme (for example: Martin 1972; Lotz 1972).

	pictogram	
?	ideogram (but see footnote, previous page)	
\$	logogram	
pp (meaning 'pages')	morphogram (the second 'p' only)	
O in 'IOU'	homophonic phonogram	
&	syllabic phonogram (when it appears in '&c', meaning 'etc')	
, (comma)	prosodic phonogram (when used to indicate a pause)	

Table 3.1 Categories of iconic symbols in the English writing system (adapted to table form from Westcott 1971).

Whereas iconicity and motivation, two terms used as the opposite to arbitrariness, are usually regarded as synonymous in relation to spoken language, Westcott's examples suggest that in written language it might be useful to distinguish between them. This is because ink offers the possibility of a much more literal iconicity than air. Written texts can contain not only traditionally-defined motivated words (like 'meow'), and motivated graphic effects like emboldening for emphasis, but also iconic displays (that is, pictures or symbols) which are interpreted more or less directly, not via the (supposedly) phonetic writing system. It is the latter that Bolinger picks out as paralinguistic.

It is possible to exaggerate this distinction, though, since while it may be pedagogically convenient to give children a working model of writing as a phonetic system, it is not wholly phonetic in practice, as Bolinger (1946) himself demonstrated in an earlier paper on what he termed 'visual morphemes'. Since mature readers have little difficulty in distinguishing between differently-spelled homophones, such as 'meat' and 'meet',⁴⁷ it is obvious that it is not only mathematical symbols that are understood directly from the written surface without the need for phonological equivalence. Besides the usual 'pair'/'pare'/'pear' examples, Bolinger cites the use of '-or' as a suffix of prestige, citing attempts to upgrade professions such as 'advisor', 'expeditor', and even 'weldor'. In an earlier incarnation of the same debate, Henry Bradley (1928) cites a number of similar examples, including the attempt of the compilers of the Oxford English Dictionary to determine whether 'grey' or 'gray' is correct:

'Many of the replies, especially those from artists, were to the effect that the writers apprehended grey and gray as different words, denoting different varieties of colour.'⁴⁸

Bradley suggests that one of the consequences of the partly ideographic nature of writing is the divergence of written and spoken language. As a lexicographer he was aware that new 'graphic' words can be readily constructed from Greek or Latin roots, with little regard to their pronunciation:⁴⁹

 $^{^{47}}$ It is ironic that the distinction between aural and oral can be neither articulated orally nor detected aurally.

⁴⁸ The converse of such observations is that many (iconic) pictograms are culturally biased (Mangan 1978) and are thus arbitrary to those from other cultures. For example, when using a guide-book with numerous pictographic symbols, we often have to look them up in a key in much the same way as we look up unfamiliar words in a dictionary. Their iconic origins may only become apparent after we are aware of their intended meaning. And Baron (1981) reports that iconicity is a surprisingly unimportant factor in the learning of sign-languages for the deaf, autistic or mentally retarded.

'For these words the normal relation between alphabetic writing and speech is simply reversed: the group of letters is the real word, and the pronunciation merely its symbol.' (Bradley 1928: 178)

That writing is treated as ideographic by readers is confirmed by psychologists, who have long debated whether written symbols need to be recoded into a phonological form before they can be understood. Reviewers (such as Massaro 1979; Baddeley 1979, 1984) have reported that subvocalization is not a necessary stage in the fluent reading of relatively easy sentences, although sometimes used for complex comprehension tasks. This, Baddeley argues, is because subvocalization helps retention in shortterm memory by means of what he terms the 'articulatory loop' (analogous to an audio-tape loop that can be instantly replayed for checking). However, Baddeley & Lieberman (1980) also propose an equivalent subsystem for visual information: the 'visuo-spatial sketch pad' and Kleiman (1975) suggested a model that contains both a visual and a phonological store. Although there is still some disagreement at the sentence level, there seems to be agreement at the word level that, although sometimes used by readers, phonological equivalence is not in itself a criterion for a readable symbol. The current view is fairly represented by Kolers (1985: 410) who remarked:

'The linguist's view of reading as requiring phonological mediation might be said to imply that vision is dumb but hearing is smart ... This claim cannot be taken seriously any longer, and the wonder is that it was taken seriously for so long during the 1960s and 1970s. Are faces, scents and music recognized by finding their surrogates in speech?'⁵⁰

⁴⁹ The best examples are found in the multi-syllabic compound words coined by chemists, which can be as complex as the chemical compounds they denote. The word 'syntagm', used later in this chapter is another example of a graphic word with no obvious pronunciation in English. Although Wade Baskin's translation of de Saussure (1916/1974) uses the word 'syntagm', it does not appear in my dictionary. Some take 'paradigm' as a guide and pronounce it 'syntam', others say 'syntagum', while most, I suspect, treat it like Polish names in a newspaper report—we note their graphic shape but don't actually attempt to pronounce them

⁵⁰ An interesting and perceptive variation of subvocalization is mentioned by IA Richards, who observes that the visual image of words in poems is accompanied not only by an auditory image but also by 'the image of articulation—the feel in the lips, mouth, and throat, of what the words would be like to speak' (Richards 1926: 119). The related issue of oral and silent reading is discussed further in Chapter 4.

Levels of analysis: letters, words, paragraphs

It is also worth noting that the concept of writing as a completely phonetic transcription of speech is a mistake that can only be made by users of alphabetic writing systems such as our own. The inadequacy of that assumption must be obvious to the Chinese, whose own writing system is not phonetic, and who, having recently implemented major changes in the way their language is romanized, must be only too aware that alphabetic graphemes are but a crude approximation of phonemes.

Moreover, most historians of writing place pictographic or ideographic systems prior to phonetic ones (for example, Gelb 1963; Diringer 1962). Although our evolutionary perspective may lead us to conclude that the earlier systems were therefore proto-stages in the development of the allconquering alphabet, they can hardly have been unfunctional—indeed, they were used for centuries. The Chinese experience is that there are trade-offs between the simplicity of the phonetic method and the multilingual comprehensibility of the ideograph. Indeed, Harris (1986) has argued that writing was developed because its independence from speech gave it certain advantages:

'Hence it is particularly perverse of modern scholarship to present progress in human written communication as consisting in working towards devising one system, namely the alphabet, which was an improvement over its predecessors in being specifically tied to pronunciation.' (p. 119)

The alphabetic system obviously does have a phonetic basis, but its real advantage is its economy of symbols: something modern linguists, with their spectrograms and computers, might not have achieved. Our own limited alphabet provides an approximate phonetic system while preserving etymological clues about word origin and meaning, and enabling the exploitation of printing with moveable type. The earlier Chinese and Korean inventions of moveable type (McMurtrie 1937) were not destined to last, given the multiplicity of characters in their writing systems.

It may be that the scope of the arbitrary/iconic distinction is relative to particular levels of linguistic analysis. Indeed, Westcott (1971: 426) suggests that

'iconism is a relative rather than an absolute characteristic of any communication system, language included. As regards iconism, then, the only realistic question we can ask about a given form is not "Is it iconic?" but rather "How iconic is it?".'

If the existence of limited sets of highly iconic signs (such as pictograms) simply exploits the way we normally read, why should there be any problem in analysing a sentence which contains a pictogram, say, of a **s** instead of the word 'telephone'?⁵¹ That pictograms are out of bounds is understandable only if we are looking for systematic relations between language components within the word (that is, phonemes and morphemes). Above that level it seems irrelevant how particular words are graphically rendered, so long as they are comprehended in an equivalent way by readers. This is the view taken by Trager (1974) who, although somewhat uncompromising with regard to the primacy of speech, is prepared to accept symbols as writing if they constitute

'a systematic representation of linguistic elements—specific morphological (words, phrases) or phonological (phonemes, syllables) items.' (p. 380)

In practice, it should be added, there are limits to this. Firstly, because there is a strictly limited vocabulary of symbols or formulaic pictures which we can rely on others to understand as reliably as if they were words; and, secondly, because many words contain grammatical as well as lexical information (that is, 'inflective' information about case, tense and

⁵¹ The rebus—the use of pictograms to indicate the sound of the name of the thing depicted rather than its meaning—is regarded by historians of writing as an important transitional stage between ideographic and phonetic writing systems. I suspect, however, that the fact the rebus is now largely confined to the status of a curiosity indicates just how non-phonological the reading process has become. The rebus principle can be demonstrated with letter-games where we are meant to say the letters and listen to the sounds they make: for example, U R N NML, I M A UMN BN (You are an an-im-al, I am a hu-m-an be-ing).

so on). In practice, pictograms can most reliably substitute for words in what Quirk et al (1985) call 'block language'—single word captions, headings and labels—as distinct from sentenced language. For example, while some Open University textbooks use the words 'audio-cassette' or 'reading' to draw attention to links between the main text and supplementary course components, others substitute directly-equivalent icons of audio-cassettes or televisions:

The word level may also be significant to historians of writing, who discriminate between the different levels of analysis at which writing can display language. Harris (1986) argues that, since it is more likely that the progressions from pictographies to syllabaries to alphabets were partial rather than total revolutions, these writing systems must have something in common:

'All three are equivalent at a linguistic level of great practical utility, but for which we have no current linguistic term: and this is, significantly, because modern linguistics insists on talking about language in terms of hierarchies of discrete units. The nearest approach to what we want would be to call it the level of "word identification".' (p. 116, my italics; Harris puts quotation marks around the term to indicate its disputed status among linguists.)⁵²

If pictograms can only be treated as words, more elaborate iconic displays such as pictures might perhaps be viewed as linguistic components at a higher level of analysis: as equivalent to paragraphs or other verbal segments larger than the sentence. Indeed, Eco (1976) suggests that the verbal equivalent of an iconic sign

'(except in rare cases of considerable schematization) is not a word but a phrase or indeed a whole story.' (p. 215)

A picture of, say, a horse, is at a much greater level of particularization

⁵² This view is rather spoilt, though, by the fact that the universal use of word separation was apparently a seventh or eighth century innovation (Saenger 1982). In any case, an alternative phrase might have been 'concept identification', since a clear notion of the 'word' may not predate literacy, but may instead be a consequence of it. According to Goody (1977), some modern societies where literacy is not fully established do not have a concept of the word.

than the word 'horse': it shows, for example, a black horse galloping, or a white horse standing still. 53

In such cases, however, the image alone may be insufficient for its own interpretation. Indeed, Gombrich (1960) argues that no pictorial image gains the status of a 'statement' unless an explicit reference is made to what it is supposed to represent. In the case of propaganda photographs of alleged war atrocities, for example, it is the false captions not the photographs which lie. Barthes (1977) uses the term 'anchorage' to describe the relationship of pictures to captions or other accompanying verbal language: most pictures are capable of several interpretations until anchored to one by a caption. One way to handle the picture-caption relationship is to regard them as a single textual unit (or, at least, as tied units in the manner of a noun phrase, or a compound word). Garland (1979), who classifies components of diagrams, significantly includes 'caption' as an integral characteristic.

We may take it, then, that iconic forms (or even iconic qualities of verbal forms—display typefaces with special associations, for example) need to be welded in to the context, or overall cohesive structure, of a particular text. But this is no less true of verbal components of texts: words, and even sentences, however well-formed, are meaningless in isolation from a context. The experiments of Meyer (1975) showed that even paragraphs can be interpreted in different ways according to the context in which they are found. However, it is rather more of a challenge to achieve such cohesion in the case of typographic, pictorial or diagrammatic displays. Whereas prose is submitted for publication in the order in which it is to appear, illustrations are generally submitted separately and integrated (if at all) at a later stage of text production over which the writer traditionally has little control. Some implications of this will be noted in

⁵³ The greater level of particularization of pictures points to an essential difference between pictures and pictograms which is reflected in their normal graphic treatment. The modern pictograms typically found in airports and travel guides are intended to convey generalities of the same order of abstractness as words. Their characteristic graphic neutrality is perhaps the most significant aspect of their invention by the Isotype Institute (Neurath 1936).

later chapters—in particular, the need for closer integration of writing and design processes will become apparent (Chapter 9), and the effect of adopting the page or double-page spread as a 'linguistic' unit will be noted (Chapter 7).

The segmentation problem

It is apparent, then, that the strict arbitrariness criterion can be circumlocuted to some degree. More central to the linguistic model than arbitrariness is the ability to identify systemic relations amongst the data (that is, samples of language or typography). This in turn would seem to depend on the data being clearly segmented at the appropriate level of analysis, since mainstream linguistic science relies on a distinction between an inventory of components (at the sentence level, the lexicon) and rules for their combination (the grammar).

Seen from this perspective, iconicity and motivatedness only become problematic to the linguist when they prevent such segmentation. For some typographers that might be the end of the matter, since their task is simply to render an author's linear string of words and pictures in an acceptable but still linear form, perhaps embellishing the text with a moderate amount of, for example, italicization, emboldening, or colour. But although all typographers start with segmented matter (words, lines, pictures and so on), many take the opportunity to break out of the linear string to use both dimensions of the page—in Twyman's (1982) terms, to use extrinsic features of the composition system as well as intrinsic features. In such cases, meaning may be added to the segmented string through the analogue shape of the whole layout. Such non-linear, unsegmented and analogue features present something of a challenge to the linguistic model. To pursue this issue further it is necessary to make a brief excursion from the typographic context to that of pictorial imagery, a much more severe test of the linguistic model.

Writers on graphic design often talk as if there is a language of visual imagery which mirrors verbal language. Booth-Clibborn and Baroni (1980), for example, claim that they 'have analysed the graphic language over the last few decades and have found that a universal syntax emerges'. Thompson and Davenport (1980) similarly claim that 'graphic design is a language. Like other languages it has a vocabulary, grammar, syntax, rhetoric'.

These are bold claims and, although made in short introductions to illustrated books and backed up by no specific evidence, are probably seriously meant. They are in good company, since others with more serious theoretical intentions have also maintained that apparently unsegmented graphic images can be analysed in a linguistic manner.

Ivins (1953) used the term 'syntax' to describe the conventions used by engravers to make reproducible images before the days of the photographic half-tone. For Ivins, visual syntax referred not to the objects depicted but to the manner in which black and white lines were deployed in order to produce the complete grey scale. For example, wood engravers use closely-spaced cross-hatching to create the illusion of light and shade.⁵⁴ Although it is less obvious from a distance, the same technique of illusion is used when photographs or paintings are 'screened' (broken into dots of various sizes) for printing. According to Ivins, different syntaxes grew from the various print-making technologies and stylistic inventions of particular artists and eras. The typographic equivalent might be the different repertoires of variants offered by different composing systems (for example, the upper case/lower case/underlining/ second colour repertoire of the mechanical typewriter as compared with the greatly extended range of the phototypesetting machine).

Illustrators and engravers are responsible for making every mark

⁵⁴ Elsewhere (Ivins 1943), Ivins makes explicit reference to psychological experiments into visual illusion, but the full extent to which representational art rests on illusions of all kinds has been discussed at length by Gombrich (1960) and Arnheim (1969).

contribute to the depiction of a visual scene. In effect, each line, mark or smudge explains some aspect of the object depicted or the play of light upon it: hence Ivins' use of the term 'syntax'. He also refers to perspective as a 'logical grammar for the representation of space relationships in pictorial statements' (p. 23; my emphasis). Twyman (1985), who reviews a number of implications of the language analogy, also uses the word 'grammar', although within quotation marks, in relation to conventions of drawing, such as cut-away, isometric and perspective techniques.

Ivins' use of the term 'syntax' is appropriate only in the limited sense that he is dealing with systems for the combination of separate components.⁵⁵ In verbal language it is syntax that dictates which word-orders are legal and which are illegal. Without separate components, then, syntax is an inappropriate term. Ivins' components, though, are of a very low semantic status—visible marks, such as cross hatchings or dots, rather than signs with an independent meaning comparable to that carried by words in verbal language.

A 'linguistic' approach to iconic displays at a higher semantic level is proposed by Gombrich (1960), who chooses vocabulary rather than syntax as the point of comparison.⁵⁶ Gombrich does not so much look at the exact mark-making system of the artist as the people and things that he or she depicts. With some notable exceptions (such as the impressionists, nineteenth-century wood-engravers working from photographic originals

⁵⁵ Since they do not consist of separate marks, Ivins regards photographs as 'pictorial statement without syntax'. Ivins' view of photographs as unmediated samples of reality may not have been a fully considered one, since he sees them largely in contrast to engravings where the mediation is extreme. However good the verisimilitude of a picture or photograph, it is still the product of an artist or photographer who must frame the image and select an appropriate technique for projecting it onto the two-dimensional surface of the page. Even the most descriptive pictures are selected for a purpose and so are to some degree explanatory.

⁵⁶ In an early instance of the linguistic analogy (in De pictura, drawn to my attention by Van Sommers 1984), Alberti draws a parallel between the learning of writing and of painting:

^{&#}x27;I would have those who begin to learn the art of painting do what I see practised by teachers of writing. They first teach all the signs of the alphabet separately, and then how to put syllables together, and then whole words. Our students should follow this method with painting. First they should learn the outlines of surfaces, then the way in which surfaces are joined together, and after that the forms of all the members individually.' (Alberti 1435/1972: 97). As Twyman (1985) shows, manuals for teaching artists often take a similar approach, in which

As Twyman (1985) shows, manuals for teaching artists often take a similar approach, in which images are built up from schematized elements.

and the recent school of super-realists), most artists have not behaved like digital scanners, transcribing exact retinal images onto the canvas. Instead, Gombrich argues, most artists have seen their task as the depiction of separate (or at least, potentially separate) semantic units, albeit considerably modified and merged into unitary compositions. Twyman (1985) makes a similar distinction between synoptic images and images composed of discrete elements



Figure 3.1 Objected-oriented computer graphics (a), Isotype diagrams (b), and heraldry (c) are examples of graphic displays formed from discrete semantic units.

This approach is the basis of object-oriented computer graphics programs. As Figure 3.1a demonstrates, these programs can treat parts of images as separate objects which can be copied, rotated, enlarged and so on. It is also the main principle of the Isotype system of pictorial communication which uses a vocabulary of standard symbols (Neurath 1936; see Figure 3.1b). An older example of a visual system with linguistic parallels is heraldry (Figure 3.1c), with its vocabulary of symbols, grammar for their combination and high-priesthood of grammarians (the heralds).

Gombrich, though, does not confine his schema theory to images composed of discrete elements. He relates a process he calls 'schema and correction' to both the creation and the reading of synoptic images.⁵⁷ According to Gombrich, artists draw on a vocabulary of visual schemata which are then corrected to fit the task in hand. His alternative phrase is 'making and matching': a previously made image is matched to the purpose in hand. This is easy to see in children's drawings where houses, cars and people are typically represented in stereotyped ways, with special details added to identify the particular house or person concerned: a child's drawing of 'Mummy' may be a combination of a woman-schema and an accessory such as a hat or bag to identify which woman. Eco (1976: 206) calls such details 'recognition codes' for pertinent information. Gombrich cites historical examples as evidence for his claim that the same effect can be seen in adults' pictures as visual schemata develop within a culture over many years. (Figure 3.2 shows an example).



Figure 3.2 Gombrich uses this example to explain his concept of making and matching. A German artist has drawn a flood scene in Rome from verbal reports. The timber castle with the steep roof represents his schema of a (German) castle, but it is modified by a number of features he knows the real castle possesses: round towers, for example.

 57 In contrast to Ivins, who regards syntax as necessary for the making of images but says that 'once they are put together there is no syntax for the reading of their meaning.' (p. 61).

Although he appears to be using the word 'language' as a loose analogy, Gombrich maintains that:

'Everything points to the conclusion that the phrase "the language of art" is more than a loose metaphor, that even to describe the visible world in images we need a developed system of schemata.' (p. 76) He goes on to claim that particular cultures have 'vocabularies' of schemata which might cover, say, people, animals, architectural styles, landscapes and so forth.

Not surprisingly, the parallel between graphic images and verbal language has proved controversial. Critics of the 'language of art' viewpoint, such as the philosopher Susanne Langer (1942), point out that there are no pictorial equivalents to the syntagmatic nature of language (its unfolding in time) and or to words with their relatively fixed equivalences that enable the construction of dictionaries. Langer draws on Gestalt psychology to contrast what she terms the logical form of holistic art objects with the discursive form of verbal language. Verbal language forces us

'to string out our ideas even though their objects rest one within another; as pieces of clothing that are actually worn one over the other have to be strung side by side on the clothesline.' (p. 81)

She acknowledges that pictures can function as symbols but 'a work of art is a single symbol, not a system of significant elements which may be variously compounded'. The symbolic function of iconic displays 'depends on the fact that they are involved in a simultaneous, integral presentation' (p. 97). Langer's position is rather metaphysical—perceptual forms are for the 'conception, expression and apprehension, of impulsive, instinctive and sentient life'—and not entirely helpful to those seeking an articulated critical method.

Nelson Goodman (1976) has also stressed the unsegmented nature of visual images. According to Goodman, although it is possible to distinguish between constitutive and contingent properties of a work of literature, this is not true of paintings. Goodman maintains that the concept of a fake copy of an existing novel is a nonsense, so long as the words are correctly ordered and spelled.⁵⁸ The words originally composed by the novelist are what constitutes the work: other things, including, presumably, the typographic layout (except those aspects specified by the author), are in Goodman's terms contingent:

'In painting, on the contrary, with no such alphabet of characters, none of the pictorial properties—none of the properties the picture has as such—is distinguished as constitutive; no such feature can be dismissed as contingent, and no deviation can be dismissed.' (p. 116)

Goodman compares both verbal and visual forms with an ideal concept of notation which has a number of syntactic and semantic characteristics: in particular, the symbols or characters in a notational system must be unambiguous, disjoint and differentiated. Verbal language fulfils only some of these requirements, paintings none of them. However, verbal language does at least satisfy the requirement to be differentiated and disjoint. This makes it an articulate system, in contrast to the dense nature of undifferentiated (or, to restore the term we have been using up to now, unsegmented) systems such as paintings.

In effect, Goodman's view supports the notion, introduced earlier in this chapter, that segmentation is more important than arbitrariness in determining whether a linguistic (or some other systematic) approach might be applied to graphic forms. 'Descriptions are distinguished from depictions not through being more arbitrary but through belonging to articulate rather than to dense schemes; and words are more conventional than pictures only if conventionality is construed in terms of differentiation rather than artificiality.' (p. 230)

⁵⁸ Unless, presumably, it is claimed to be a copy of the first edition, in which case we are considering it as qua printed object or investment, not qua novel. More seriously, while we may accept Goodman's analogy at face value in the context of his argument, there are important exceptions. Considerable numbers of writers—mostly poets, but also some novelists—have taken a detailed interest in the typography of their work, or have used it as an integral part of their expressive repertoire. This issue is the subject of debate among bibliographers and some further aspects of it will be discussed in Chapters 4 and 7.

The unique position of typography, and its special interest, is that it fits awkwardly into the picture/words dichotomy. When typographic pages add spatial and graphic qualities to segmented verbal language, they demonstrate the simultaneous use of dense and articulate symbol systems. But Goodman, in common with other philosophers and historians of art, seems reluctant to discuss hybrid forms, and his discussion of diagrams another hybrid form—is short and somewhat confused.⁵⁹ His main argument on this topic centres around a comparison between an electrocardiogram (a diagram) with a Hokusai drawing of Mount Fujiyama (a depiction). He suggests that 'the black wiggly lines on white backgrounds may be exactly the same in the two cases'. He does not provide a sample of such a drawing (as will become apparent, Hokusai prints do not actually look like diagrams), but Figure 3.3, supplied by Twyman (1985), represents the principle.



Figure 3.3 A sound spectrogram which was interpreted by one viewer as a petrochemical works

Goodman appears to suggest that, although according to his notational theory a diagram is syntactically dense, yet it is still somehow articulate because it is still possible to distinguish between its contingent and constitutive features:

'The only relevant features of the diagram are the ordinate and abscissa of each of the points the centre of the line passes through. The thickness of the line, its color and intensity...do not matter.' (p. 229)

⁵⁹ Or, at least, confusing—the layman hesitates to argue with any philosopher, especially one who advises that 'the reader with no background in logic, mathematics, or technical philosophy may well skim or skip [his explanation of the syntactic requirements of notation] and rely on gathering from the applications and illustrations in later chapters the principles expounded here.' (p. 130, footnote)

In effect, Goodman is saying that the essential meaning of the electrocardiogram is preserved even when these contingent factors are altered, whereas each such characteristic of the picture (including even the quality of the paper, conveniently forgotten earlier when the artefacts were said to be exactly the same) contributes to its overall meaning and ambience.⁶⁰

In practice, of course, we interpret images in the light of what we understand of their context and purpose rather than the philosophical basis of their notationality. Conceptual art apart, electrocardiograms are not framed and put up for auction any more than Hokusai prints are found on clipboards at the feet of hospital beds. Goodman appears to acknowledge the importance of context elsewhere, when he suggests that whether a diagram is analogue or digital is determined by how we are to read it. However, he chooses an example that seems to demonstrate exactly the opposite. A graph produced by a barogram is analogue because, consisting as it does of a continuous trace of a moving pen onto a moving roll of paper, Goodman can claim that it is syntactically dense: every point on the line represents real data. But if the curve merely joins up separate data points, representing, say, annual car production over a decade, it is syntactically disjoint and therefore digital. This seems to ignore the fact that an important purpose of such graphs is to convey analogue information about trends. Although produced from a finite number of data points and connectives, in practice we read the car production graph as if it were a continuous curve of data. That is the raison d'être of this type of graph: to reveal the underlying trends among separate data points.

⁶⁰ In fact, Goodman's examples are not quite as clear cut as he suggests. The apparent spontaneity of Oriental calligraphy and drawing is often rehearsed many times before the production of the final version; in other words, it is highly schematized. Moreover, as Schapiro (1969) points out (albeit in relation to Chinese art) the blank space, or ground, against which the image appears, is not considered constitutive of the image in the same way as it might be to Europeans:

^{&#}x27;In China where painting was a noble art the owner did not hesitate to write a comment in verse or prose on the unpainted background of a sublime landscape and to stamp his seal prominently on the picture surface.'

Conversely, apparently contingent aspects of graphs, such as thickness of line and colour, are the subject of substantial research and debate (for example, Tufte 1984). Furthermore, if an electrocardiogram exhibited variations in the thickness of the line (said to be constitutive in the case of the Hokusai), the machine might well be sent for repair and its output regarded with suspicion.

Indeed, we would read the (analogue) trend even if the data points were not joined up, as in a bar chart. In such cases the relationship between components of the image can be considered constitutive. The whole may similarly be greater than the parts in the case of typographic layouts: pages are assembled from separate components but communicate structural information through their overall shape or order. Like graphs, they may be syntactically articulate in their construction but not in interpretation.

That analogue relationships may be constitutive can be seen by comparing Figures 3.4a, 3.4b and 3.4c which all purport to demonstrate the same principle (of selective perception). One is supposed to be able to see each as either a rabbit or a duck but not both at the same time. First demonstrated in a German magazine in a realist style, the duck-rabbit illusion has become a standard demonstration among, as can be seen from the sources of these examples, art critics, psychologists and philosophers. Two of them palpably fail.



Figure 3.4 This illustration is frequently used to demonstrate the principle of selective perception: you can read it as a duck or a rabbit but not both at once. The illusion works quite well in 3.4a (from Gombrich 1960). In 3.4b (Wittgenstein 1958) I can see the duck, but the rabbit is rather strange. In 3.4c (Bruce & Green 1985) I am quite unable to see anything except a stylized squid.

They fail because, although to their authors they have become tokens of a familiar argument, they don't include enough essential or constitutive information to the new reader. To those familiar with it, it seems, there are just three ingredients to the picture: a head, an eye and a bill/ears feature. Any sketch containing these three features presumably signals the duck-rabbit illusion schema adequately to those for whom it has long

ceased to be effective as an illusion anyway.

To the unfamiliar, though, the exact spatial relationship between the ingredients is itself a constitutive feature without which, as the second and especially the third versions show, the illusion is ineffective. Again, if the purpose of the picture was to signpost the rabbit cage in a zoo, or to depict a particular rabbit, our criteria would change further.

Ivins includes a similar example from the sixteenth century (Figure 3.5). When illustrations had to be copied from book to book, copyists transferred only what they saw as the major constitutive components (leaves, stalks, flowers), treating the relationship between the components and their exact shapes as contingent. Although the picture still symbolized 'plant', and no doubt helped to sell the book, the illusion (of verisimilitude, in this case) was lost. Again, although the constitutive/contingent distinction is a useful one, it is clearly relative to particular purposes.



Figure 3.5 Both of these sixteenth-century woodcuts depict violets. Ivins (1953) compares the overrationalized example on the left (from the *Grete Herbal*, 1525) with the naturalistic example on the right (from Brunfel's *Herbarum vivae eicones*, 1530). However, while the earlier woodcut is clearly overschematized, the later one is possibly too realistic: it is debatable whether the wilting leaves are really constitutive of the species represented.

In a well known analysis of an advertisement for packaged food, the literary critic and semiologist Roland Barthes (1977) resolves the question of holistic or analogue qualities by treating them as just another sign:

'Even when the signifier seems to extend over the whole image, it is nonetheless a sign separated from the others: the "composition" carries an aesthetic signified, in much the same way as intonation although suprasegmental is a separate signifier in language. Thus we are here dealing with a normal system whose signs are drawn from a cultural code (even if the linking together of the elements of the sign appears more or less analogical).' (p. 46)

A good analogy might be piano music. Since it is produced by separate key strokes, and conventionally divided into regular bars, it is clearly segmented and can, to a degree, be analysed in terms of the relationship between different notes. But although computers might be able to recognize a melody from such an analysis, most of us can only do so by hearing it played. We recognize the overall 'shape' made by the notes, together with other non-separate (or 'suprasegmental') features, such as crescendos and rhythms. Barthes' suggestion is that such patterns, since they are meaningful to us, are themselves signs, even if they cannot easily be segmented for analysis.

Barthes' use of the term 'cultural code' indicates that, like Gombrich, he does not so much analyse the physical marks (notational or otherwise) that make up a picture as the cultural significance of the objects portrayed and the manner of their portrayal. Whether a picture is rendered photographically or through one of Ivins' syntaxes, whether we are looking at reality or depictions, we can still distinguish between separate objects. As Gombrich remarks elsewhere:

'We could not perceive and recognize our fellow creatures if we could not pick out the essential and separate it from the accidental.' (Gombrich 1982: $106)^{61}$

Whether or not we can apply the linguistic method to all of culture—for no aspect of existence escapes the semiologist's eye—is another matter entirely.⁶² Linguistics can be seen as just a prototype of the broader

 $^{^{61}}$ Gombrich use of these terms reminds us that Goodman's distinction between constitutive and contingent features echoes that between essential and accidental properties in Aristotelian logic.

 $^{^{62}}$ I freely confess my alignment with the intellectual cowards chided thus by Sturrock (1986: 89):

^{&#}x27;This dramatic extension of the semiotic field, to include the whole of culture, is looked on by

structuralism that has become a dominant metaphor for twentieth-century thought.⁶³ However, the existence of formal semiotic codes is not the issue here, although it will be considered further in Chapter 5. For the time being it is enough to note that there is consistency and pattern in the world, that many human activities are highly conventionalized and that we have a remarkable capacity for inferring meaning from all sorts of circumstances.

The problem of linearity

According to de Saussure:

'While [the linear nature of the signifier] is obvious, apparently linguists have always neglected to state it, doubtless because they found it too simple; nevertheless, it is fundamental, and its consequences are incalculable.' (p. 70)

Linearity is fundamental for de Saussure because it is the basis for one of his two fundamental categories of linguistic relations: syntagmatic (as distinct from associative, often referred to as paradigmatic). Syntagmatic relations are the relations that a word has with others in the linear string, or syntagm; associative relations are those that a word has with others that might take its place in the string.⁶⁴

Barthes (1964/1967) applies de Saussure's associative/syntagmatic dichotomy to a challenging range of semiotic systems, including clothing,

Eagleton describes structuralism as

'a symptom of the fact that language, with its problems, mysteries, and implications, has become both paradigm and obsession for twentieth-century intellectual life.' (Eagleton 1983:97)

 64 For example, in the sentence 'This is a cat', the word 'cat' stands in syntagmatic relationship to 'This is a...' and in associative relationship to 'pet' or 'animal'. A helpful ordinary-language version is sometimes used: choice and chain.

those suspicious of it as a kind of intellectual terrorism, overfilling their lives with meaning.'

⁶³ De Saussure (1916/1974: 68) saw language as the paradigm symbol-system: 'Signs that are wholly arbitrary realize better than the others the ideal of the semiological process; that is why language, the most complex and universal of all systems of expression, is also the most characteristic; in this sense linguistics can become the master-pattern for all branches of semiology although language is only one particular semiological system.' (my emphasis)

meals and furniture. He is able to do so with little difficulty because all of these systems consist of discrete elements (ie, garments, dishes and chairs etc). Later, though, (Barthes 1981) he talks of iconic syntagms, by which he means an analogical representation that cannot be subdivided, but which can be treated as if it were a verbal syntagm (that is, a sentence or paragraph). A verbal syntagm is indeed a cluster of signs, but it is essentially a linearly organized cluster, and there seems to be little point in transferring the term 'syntagm' to other contexts if its associations with linearity are lost. Van Sommers (1984: 1) suggests that the sequence of production can be considered as a graphic parallel to the syntagmatic dimension of verbal language: the artist can only do one thing at a time. However, this may only work in the context of his own fascinating experiments on the way people draw simple line images. The problem with this definition is that, since the sequence of production is rarely apparent to the viewer, the syntagmatic dimension can carry no semantic load. It will be suggested later in the chapter that the graphic equivalent of the syntagm is rather the sequence of inspection or reading.

Linearity may be an obvious feature of language, but that is not to say that cognitively it is ideal. On the whole, it is not a great problem at the sentence level, where comprehension can be handled within working memory—the beginning of the sentence is still available for processing when the end is reached. In a lengthy text, though, readers may need to be explicitly reminded of earlier stages in the argument which must be retrieved from deeper levels of memory. Much of the work of text linguists is directed towards an account of the ways in which language users compensate for this constraint.

The ideal of a one-to-one relationship between language and ideas is part of what has been termed 'the language myth' by Harris (1981). At its heart is the 'surrogationalist' view—the idea that words are substitutes for things or ideas—which elsewhere (Harris 1980) he traces from Aristotle to present day linguistics. This is contrasted with 'instrumentalism' exemplified by speech act theory (Austin 1962)—in which language is viewed as a multi-purpose tool, only one of whose uses is describing things or making assertions.⁶⁵ We might illustrate the distinction by contrasting the Wittgenstein of the Tractatus and the Wittgenstein of Philosophical investigations. At one point in the Tractatus, he posits an ideal language form in which

'the configuration of objects in a situation corresponds to the configuration of simple signs in the propositional sign.' (1971: §3.21)⁶⁶ Wittgenstein's suggestion was disputed by Ryle (1951: 34), however, who cited numerous examples to show how difficult it is to see

'how, save in a small class of specially-chosen cases, a fact or state of affairs can be deemed like or even unlike in structure a sentence, gesture or diagram.'⁶⁷

In Philosophical investigations, Wittgenstein (1958: 11) talks of 'language-games', by which term he wishes 'to bring into prominence the fact that the speaking of language is part of an activity, or of a form of life'. Language does not just describe states of affairs, but is used to achieve objectives—for many of which the transfer of information is incidental. The examples given indicate that he includes not only speaking in his definition of language but, among other things, writing, diagramming and drawing.⁶⁸

Although Westcott (1971) cites a number of examples of 'iconic' syntax, in which word order reflects the order of the events described, such cases are

⁶⁸ The contrast with the Tractatus is made by Wittgenstein himself:

 $^{^{65}}$ Speech act theory, and its relevance to the role of typography, is discussed further in Chapter 8.

⁶⁶ The development by logicians of notations and diagrams (Gardner 1958) can be seen as part of a dissatisfaction with the ability of ordinary language to fulfil this objective.

⁶⁷ It is interesting to note here that Ryle appears not to consider the two-dimensional form of diagrams any more suited to the direct representation of fact structures than the one-dimensional form of sentences.

^{&#}x27;It is interesting to compare the multiplicity of tools in language and of the ways they are used, the multiplicity of kinds of word and sentence, with what logicians have said about the structure of language. (Including the author of the Tractatus Logico-Philosophicus.)' (Wittgenstein 1958: 12)

rare and the 'fact structure' (as van Dijk, 1977, calls it) of the topic of discourse rarely corresponds to its linear sentence structure. With the exception of very simple narratives, with one participant and no overlapping episodes, most descriptive texts have to cope with information which is in some way non-linear. Obvious examples are texts which describe complex structures such as machines, buildings, organizations or political situations. In such cases, an essentially multi-dimensional 'reality' must be sorted into a linear string in such a way that it can be reassembled by the reader. In any case, even where there is a simple linear fact structure, there may be rhetorical reasons for describing the facts in some other order.

Fact structure—the structure of a process or state (real, analogous or imaginary) as posited by the writer—might be contrasted with argument structure, the surface structure of a particular text, written for a particular audience or range of audiences. We can see this distinction realized in Halliday & Hasan's (1976) internal and external uses of conjunctions, which they illustrate with the following pair of examples:

a: Next, he inserted the key into the lock.

b: Next, he was incapable of inserting the key into the lock.

The same conjunction, 'next' refers in (a) to an event in '"internal" or situation time', and in (b) to an event in '"external" or thesis time' (Halliday & Hasan 1976: 240). This use of 'internal' and 'external' is somewhat confusing, though, and it is clearer to talk of (a) as an event in a sequence of facts, and (b) as an item in a sequence of arguments (always bearing in mind that 'fact' and 'argument' are here used rather loosely).

Ivins (1953), comparing verbal language unfavourably with pictures describes the linearity problem in this way:

'the very linear order in which words have to be used results in a syntactical time order analysis of qualities that actually are simultaneous and so intermingled and interrelated that no quality can be removed from one of the bundles of qualities we call objects without changing both it and all the other qualities. [...] In a funny way words and their necessary linear syntactical order forbid us to describe objects and compel us to use very poor and inadequate lists of theoretical ingredients in the manner exemplified more concretely by the ordinary cook book recipes.' (p. 63)⁶⁹

And Langer (1942), contrasting presentational (pictorial or diagrammatic) and discursive (verbal) forms says of pictures that

'their complexity...is not limited, as the complexity of discourse is limited, by what the mind can retain from the beginning of an apperceptive act to the end of it. Of course such a restriction on discourse sets bounds to the complexity of speakable ideas. An idea that contains too many minute yet closely related parts, too many relations within relations, cannot be "projected" into discursive form; it is too subtle for speech.' (p. 93)

Grimes (1975), a linguist whose work on discourse has been particularly influential among cognitive psychologists, shows that even time-based narratives are subject to the constraint of linearity, since they often involve several participants who must be identified, and whose actions may be related by overlapping, co-operation, causality and so on. Besides events and participants, most narratives contain 'non-events', listed by Grimes as settings, background information, evaluations and collateral information. I shall discuss other approaches to the analysis of 'fact structures' in Chapter 6.

While the linearity problem is at the heart of all text or discourse studies, few have directly addressed it as an issue. A recent exception is de Beaugrande (1981) whose theory of linear action is developed further in

⁶⁹ This advantage of pictures over words leads Ivins to view the development of reproducible pictures as the most significant cultural, scientific and philosophical event since the development of writing, the lack of which was the main 'road block' in the way of classical culture and science. Ivins' preference for objects over theories, the museum curator's perspective, perhaps, might have led him to exaggerate somewhat.

Text production: towards a science of composition(1984), an attempt to build a theoretical understanding of the writing process, and hence the teaching of writing, on a foundation of cognitive and linguistic theory.

Principle	de Beaugrande's explanation	Examples from typography
Core-and-adjunct	Distinguishes between core and peripheral entities	Typographic signalling of notes, glosses, etc
Pause	Allows the on-line sequence to be retarded or suspended	Interpolated boxes, inserts or footnotes
Look-back	Subsumes all consultations of the prior discourse	Regularity of layout pattern, tabular structure
Look-ahead	Subsumes all anticipations of the subsequent discourse	Regularity of layout pattern, tabular structure, headings
Heaviness	Concerns gradations of importance, emphasis, focus, length, salience, or novelty, in the sense that these all draw a 'heavier' load on processing.	Typographic emphasis, spatial isolation
Disambiguation	Deals with excluding alternative patterns, both formal and conceptual	Use of layout to direct reading sequence or to group related items; access structures
Listing	Handles the enumeration of comparable items in a sequence	'Bullets', numbering systems, tabular structure

Table 3.2 Seven linearity principles (adapted to tabular form from de Beaugrande, 1984) with my suggested application to typography.

De Beaugrande identifies the seven 'linearity principles' listed in Table 3.2.⁷⁰ They comprise a framework within which he is able to relate the various phases of cognitive processing involved in reading with the different rhetorical and linguistic forms used by writers (as well as the cognitive processes through which writers select and produce those forms).

⁷⁰ De Beaugrande' s books, although apparently aimed an interdisciplinary audience, are extremely hard going, heavily larded with citations and technical terms. Cynics may find a possible explanation on p. 284 of his Text, discourse and process (1980), where he is discussing the use of readability formulae for schoolbooks:

^{&#}x27;I consider the principle of "least effort" wholly misconceived as a standard of human activities at large and of the reading of texts in particular. Readers will gladly expend more effort, provided that the text awakens interest and rewards the effort with informative insight's. (author's emphasis)

An examination of de Beaugrande's framework may offer some insight into the linearity of language, how it is overcome, and, perhaps, how typographic techniques might contribute in this respect.

The seven principles, de Beaugrande argues, govern the ways in which writers transcribe multi-dimensional ideas into a linear linguistic form. My 'transcribe' telescopes de Beaugrande's fairly elaborate cognitive model of reading and writing into a single term, but it deserves a brief summary. De Beaugrande criticizes earlier serial models of writing which involve a series of discrete 'black-boxed' stages. Ideas progress through pragmatic, semantic, syntactic, and lexical stages until they achieve surface expression as phonemes or graphemes. These reflect the structure of linguistics and are convenient for psychological experiments, but they do not stand close analysis.⁷¹ More recent models can be described as 'parallel interactive', since they allow for the different levels to be activated simultaneously. In this context,

'linearity reflects the organization of the language modalities of speech and writing, rather than one-by-one mental processes.' (p. 104)



Figure 3.6 De Beaugrande's parallel interactive model of reading (1984)

De Beaugrande's own model (Figure 3.6) suggests six levels of processing. As he puts it,

'the zig-zagged arrow suggests a gradual migration of dominance from deep to shallow during text production, yet with considerable freedom for shifting up or down.' (p. 105)

⁷¹ Models of reading comprehension are discussed further in Chapter 4.

The psychological problem of how parallel processes are managed is not our concern, but at some stage, although originating as non-linear conceptual networks and processed at the deeper levels in non-linear ways, ideas must eventually be linearized at the surface level. Hence the seven linearity principles.

De Beaugrande does not properly explain the source of the seven categories (why seven? why these seven?), and they have a rather arbitrary feel about them. Take, for example, the relationship between surface features of the text and cognitive processes. In the case of the 'look-back' principle there seems to be a direct link: specific backwardlooking features of the surface text are deployed in order to control or facilitate cognitive looks-back by the reader. In the case of the pause principle, though, the link is tenuous. Its function in cognitive processes, to cope with processing overloads, does not appear to relate at all to its function on the text surface, where it articulates phrase and sentence boundaries.

The diagrammatic version of the principles (Figure 3.7) indicates that they overlap considerably in practice. The flow-of-control arrows show that, in most circumstances, a number of different principles must operate together. For example, following the arrows in the core-and-adjunct diagram leaves one at the end of a line, needing to return to the core in order to follow up the various other adjuncts in turn. In practice, a coreand-adjunct text might be one where the author makes a proposition and then discusses various problems and corollaries of it. First, the author must look ahead to the sub-arguments to be presented; they may even be listed. At the end of each sub-argument, the look-back principle would operate as readers are reminded of the main proposition. Finally the disambiguation principle might demand that certain arguments be dismissed and others selected for further attention.



Figure 3.7 De Beaugrande's diagrams illustrating his seven principles of linearity

Linearity is certainly implicit in speech, bounded by time, but writing, with two dimensions available, can present large tracts of discourse instantly accessible to the searching eye. Certain of de Beaugrande's diagrams might even serve as models for typographic layouts which would reveal the structure of the (non-linear) argument or encourage an appropriate reading strategy. Indeed, he does recognize that linearity in writing is spatial not temporal. But since his topic is the composition of continuous prose for fluent reading, it is perhaps not surprising that de Beaugrande restricts his view to the one-dimensional spatiality of the line, rather than the two-dimensional spatiality of the page. The one-dimensional view of language seems to be remarkably persistent among other scholars also. For example, Vachek (1967) similarly observes the spatial dimension of writing, and similarly fails to develop the implications of that fact. And even in a conference devoted to the reintegration of writing into the linguistic and psycholinguistic domains, the following statement is reported among the discussion after a debate on ideographic writing systems:

'Gough asked if all writing systems are linear. Apart from early pictographic writing, the group agreed that this was the case.' (Kavanagh & Mattingly, 1972: 128)

De Beaugrande also appears to miss or ignore a further important implication of the spatiality of writing, whether one- or two-dimensional. Because it is presented in space, not time, writing offers the reader the opportunity to physically look back, look forward, scan a list structure and so on. Without this opportunity, long and complex arguments could neither be easily written nor critically read. However, de Beaugrande restricts his view to cognitive versions of those activities:

'The processor may routinely consult the mental representation of prior text and re-scan the surface text only on strategic occasions, e.g. for revision.' (de Beaugrande 1984: 175)

However parallel the cognitive processes in de Beaugrande's model, then, the input is still assumed to be serial. But since one of the most significant aspects of writing is the release of the reader from the temporal linearity of speech, there seems no reason why the cognitive psychologist's perspective should not be extended. De Beaugrande attributes linearity principles to both writers and readers, so the implication is that 'looksback' among readers can be literal; that is, they can actually look back to an earlier point in the text rather than just their memory of it.

This suggests a crucial distinction. Still taking looks-back as an example, we might say that text features that are solely verbal 'look back' to an

earlier part of the linear text string in a metaphorical sense; the relationship is implicit in the language and must be cognitively apprehended by the reader. Text features that are graphic, or at least graphically signalled, transfer the responsibility for the look-back to the reader; the relationship is explicit in the graphic form of the text and can be perceptually apprehended by the reader—the look-back is real not metaphorical.

Another way to express this is to say that the responsibility for the syntagm has shifted from the writer to the reader. Given that readers of written text can move around it at will, it seems reasonable to propose a concept of reader-syntagm in contradistinction to the traditional syntagm which is entirely controlled by the writer. There is a time dimension to reading, just as there is to speaking, so however non-linear the text, the reader-syntagm still represents a linear input to the process of cognition. The order of that input, though, can be controlled by the reader, on the basis, perhaps, of the visual syntax, schemata or analogical codes, discussed earlier in the chapter.

A word that appears in a prose sentence is supplied to the reader in a syntagmatic relationship to its co-text—the other words in the sentence. Its associative relationships—with words the writer might have chosen but did not—are supplied by the reader's prior knowledge. Conversely, a word in a list, a prototypical graphic configuration, stands in associative relationship to its co-text.⁷² That relationship with the other words in the list is defined or reinforced by the list's title or introduction. Its syntagmatic relations are supplied by the reader who can legitimately scan the list in any order. (Readers can, of course, scan a prose sentence in any order too, but cannot be sure of gaining any form of sense predicted by the author).

 $^{^{72}}$ Harweg (1987) has recently pointed out that this characteristic of lists (and other sets of words that are not anaphorically connected) constitutes a counter-example to the normal assumption that associative relations are an aspect of langue and syntagmatic relations are a dimension of parole.

This chapter has examined de Saussure's two principles of arbitrariness and linearity as a means of identifying some of the main differences between the idealized verbal strings studied by mainstream linguistic science and the partly non-verbal, partly non-linear texts that we call 'typographic'. An important dichotomy has emerged from the discussion, between writer- and reader-syntagm. The next chapter will review evidence of it in a range of debates within the disciplines that comprise discourse studies. Chapter 5 will propose a simple conceptual model based on it.